Fractal Nanoarchitectures

George R. Newkome, University of Akron, DMR-0196231

Ruthenium is well known to undergo electron transfer processes when complexed to polypyridine ligands. Thus, it is uniquely suited for use in nanoscopic molecular devices, such as photogalvanic cells and energy storage devices. The aim of this research is to study the potential to design large polymetal arrays with the capability of fine-tuning the chemical and physical properties and hence their oxidation and reduction properties. Here we present the construction and characterization of hexametal macrocycles with different metal centers that allows us to probe their novel red-ox and dipole moment properties.

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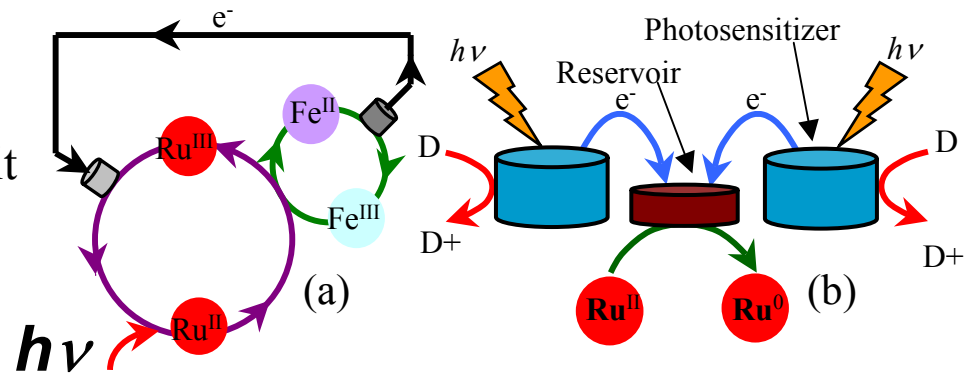
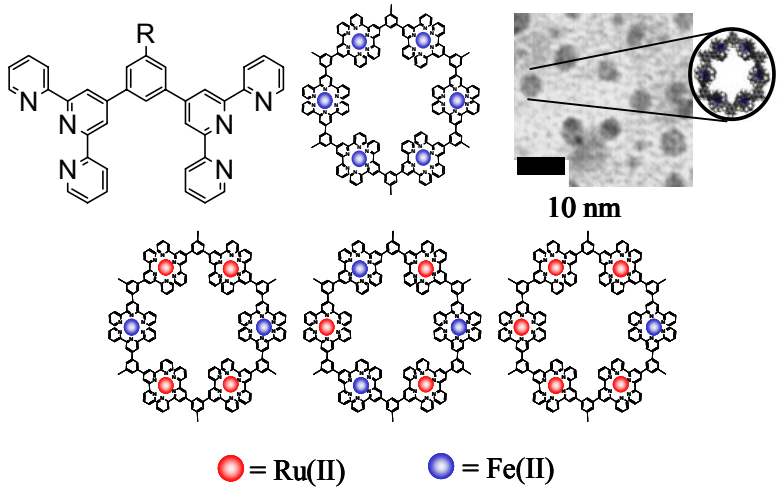


Ruthenium and its role in a photogalvanic cell (a) and an electron storage device (b).



Bis-terpyridine ligands assembled into hexameric metal arrays. A Transmission Electron Micrograph supports a calculated size of 3.5 nm.

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Education:

Under this grant, two post-doctoral scientists continue to be trained: Dr. Pingshan Wang and Dr. Tae Joon Cho; two undergraduate researchers continue to be trained: Mr. Ibrahim Ergzani and Mr. Seok-Ho Hwang; two REU undergraduate students have also been supported; Ms. Hima Maddi (4th year) and Mr. Kishore Kotta (3rd year) are also involved in the project. Currently, we are collaborating with Prof. Liming Dai (University of Akron), Prof. Luis Eshegoyen (Clemson University), and Prof. Adul Malik (University of South Florida)

Outreach:

Each summer, graduate students and post-doctoral scientists have participated in the Upward Bound Program for high school students from the University of Akron and Kent State University. The picture below shows show Ms. Brandy Courneya and Mr. Arron Hartley (summer 2004) of the REU program.